The Third Generation Wargame

A Joint/Combined Planning Tool

Matt Caffrey

Lt Col, USAFR

HQ AF/XOOC (CHECKMATE)

CHECHMATE'S Need

Plan through to a better state of peace

- Comprehensive -- Depict all impacts of air and space power on the joint campaign
- Effective -- Easily deployable, reliable
- Efficient -- Fast to learn, fast to modify, fast to execute multiple COAs

The Third Generation Wargame

A Joint/Combined Education Tool

Matt Caffrey

Professor of Wargaming & Campaign Planning

Air Command and Staff College

ACSC's Need

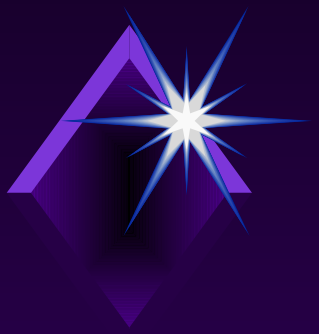
Execute the first 8 campaigns in peacetime

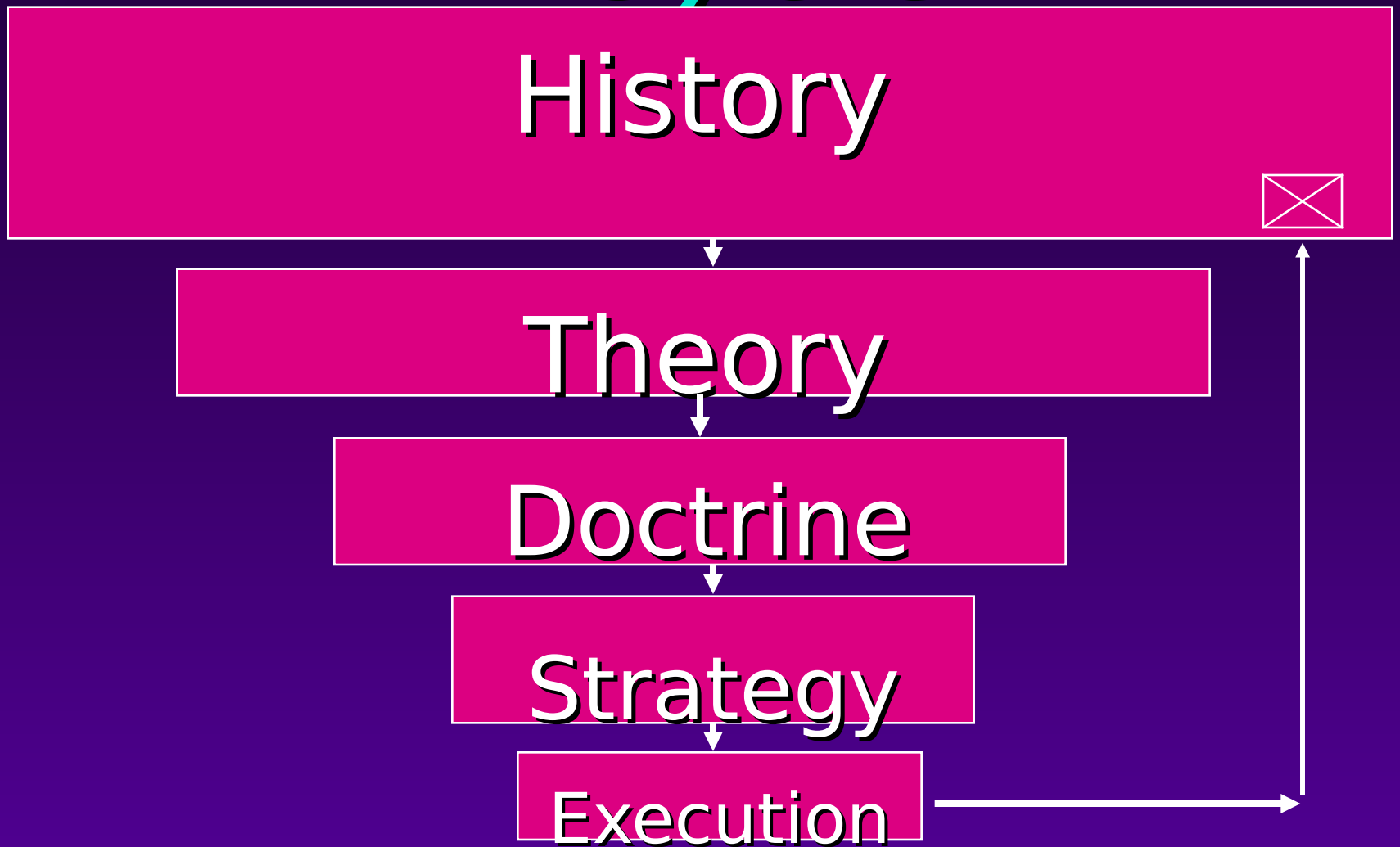
- Comprehensive -- Reinforce "all" key course objectives
- Efficient -- learn one interface execute in several courses
- Effective -- Lectures, readings, or wargames that are absorbing are more memorable

My Bio

- BS, Industrial Engineering, NJ Institute of Tech
- MA, History, Military, University of Alabama
- Co-author Gulf War Fact Book
- Originator of the Connections conference
- Designer of several wargames
- Originator of the Commercial Wargames db
- Masters Thesis on History of Wargaming

The Caffrey Cycle

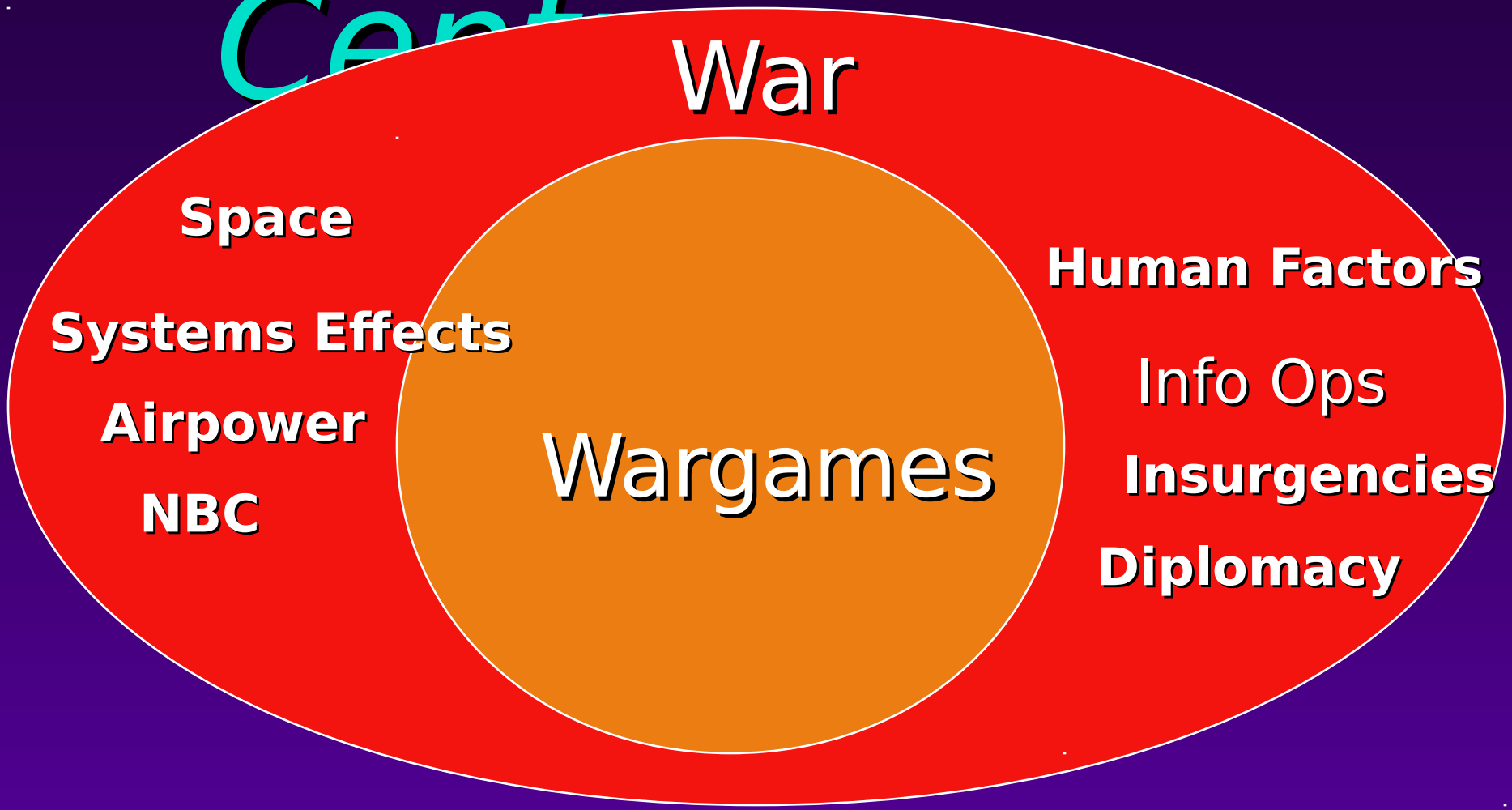




The 19th Century

The 20th Century

The 20th Cent



Precedent

Why did we lose so many test pilots on the late 1940s and early 1950s?

Distortions in data from wind tunnels, that had always been present, became significant at near sonic speeds and above.

Dr Richard P. Hallion

Air Force Historian

Assertion

Why are we having so much trouble modeling strategic effects?

Distortions, that have always been present in the models, become much more significant at the operational and strategic levels -- and with the introduction of new weapons and methods of warfare

The Problem

- Wargames, Models and Simulations do not depict how war is fought today and are likely to become more wrong in the future. The tools we do have are not widely accessible.
- Impacts
  - Ourselves -- Stove pipes, ignorance
  - The Joint Community -- O'Plans unchanged
  - Congress -- Disappointing QDR
  - The American People -- Lack of insight

The Solution

- A wargame/planning tool that depicts all aspects of armed conflict in a way that is:
  - Comprehensive
  - Accessible
- To Reach
  - Ourselves -- Doctrine, PME
  - The Joint Community -- JFC, JFACC
  - Congress -- QDR
  - The American People -- Commercial Version

Comprehensi

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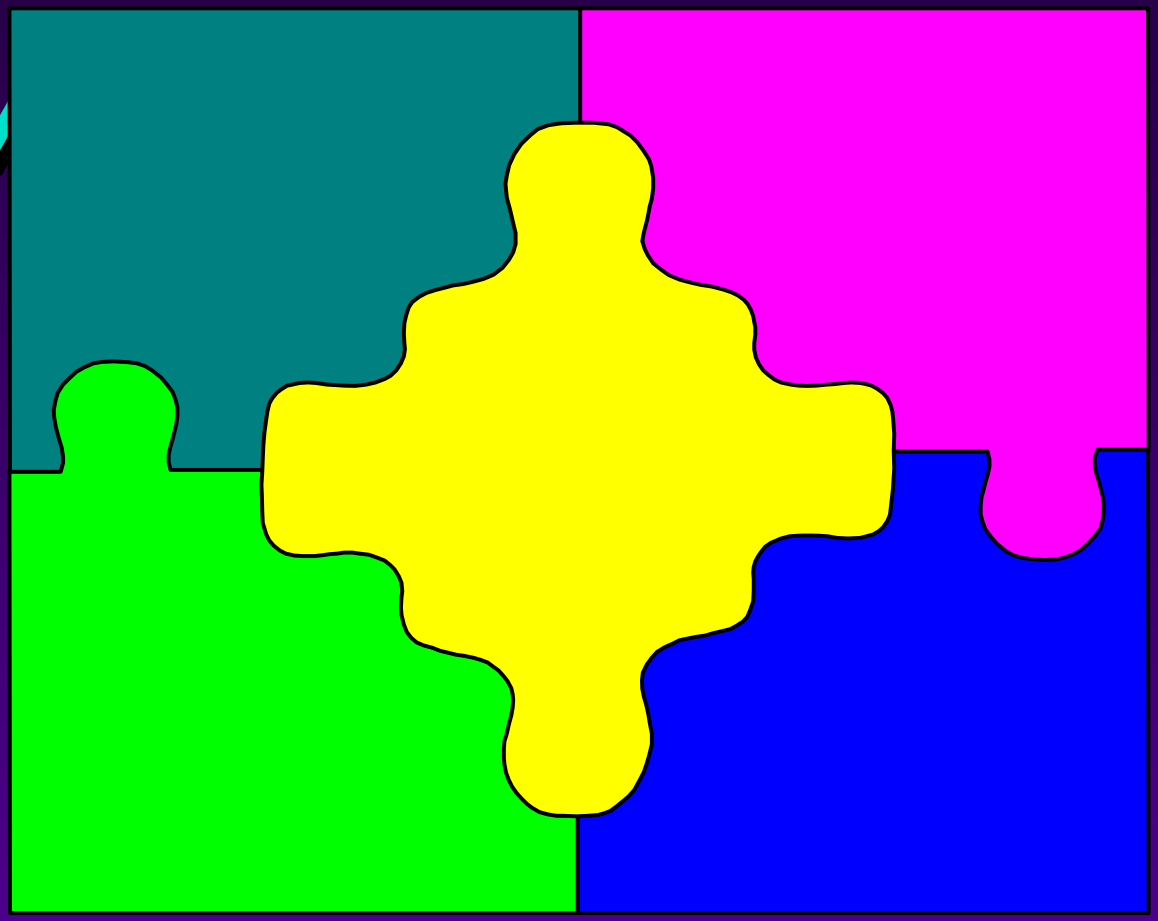
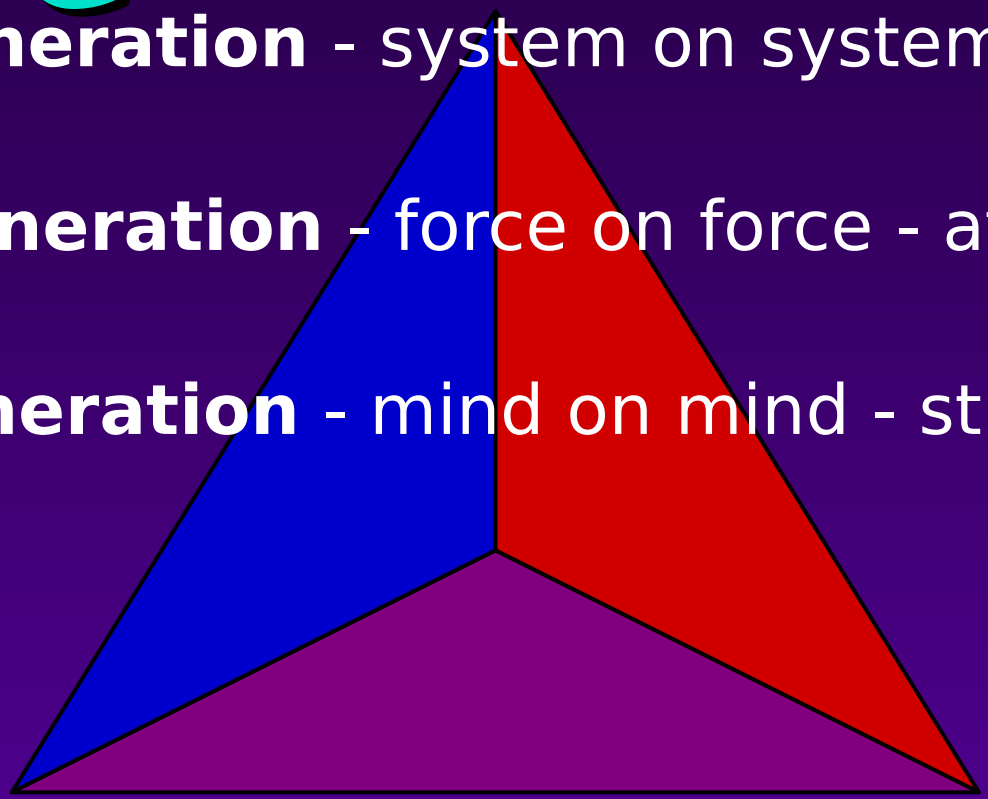


How to Achieve a Comprehensive WG

Evolve the State of the Art

- **3rd Generation** - system on system - effects
- **2nd Generation** – force on force - attrition
- **1st Generation** – mind on mind - strategy

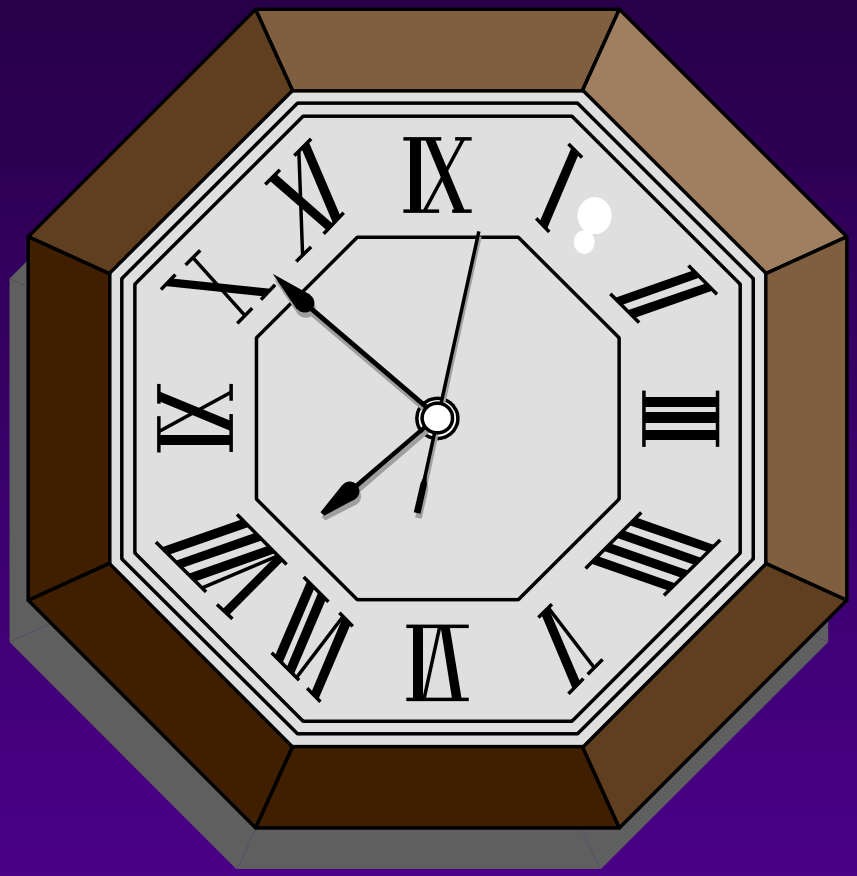


The 3d Generation Wargame

Retains the two sidedness of the 1st, the attrition of the 2nd and adds:

- Treatment of Time
- Systems Effects
- Human Factors

Time



Design Principle

Harmony between real and modeled time:

Decision Cycle = Turn Cycle

Event Duration = Simulation Duration

Reality/Simulation DC/Duration Harmony

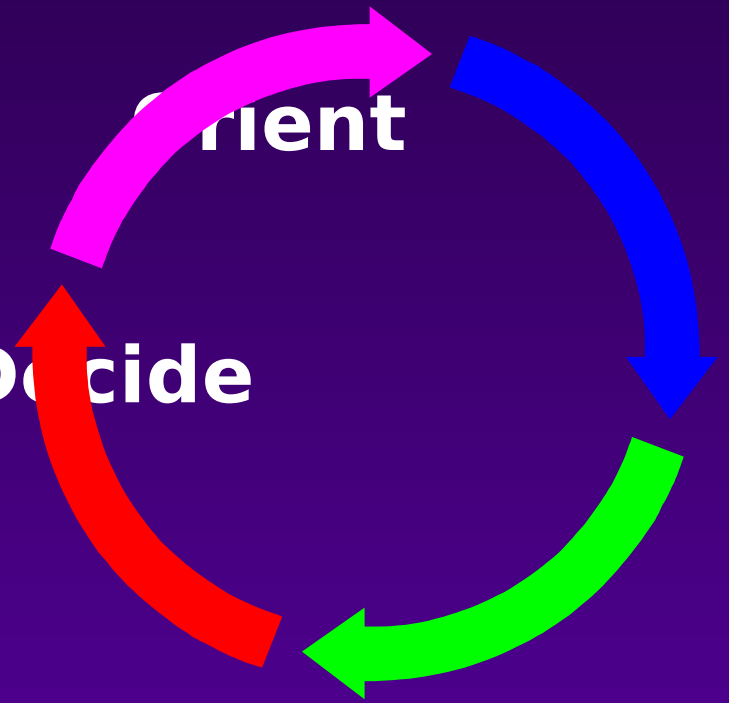
Level of War	Type of Event	Decision Cycle	Event Duration
Tactical	Battle	Seconds to Hours	Minutes to Days
Operational	Campaign	Hours to Days	Weeks to Months
Strategic	**War**	**Weeks to Months**	**Months to Years**

Consequences When Not Implemented

- Decisive Points Missed
  - "Dewey Wins!"
  - Barbarosa/Vietnam
- Subordinate Initiative Ignored
  - Link's Trip Report
- No time for strategic effects to ripple through

The Decision Loop

Col Boyd's vision of how decisions work

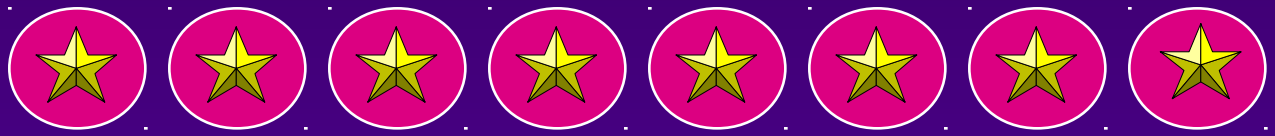


Duration Determined by Level of Command

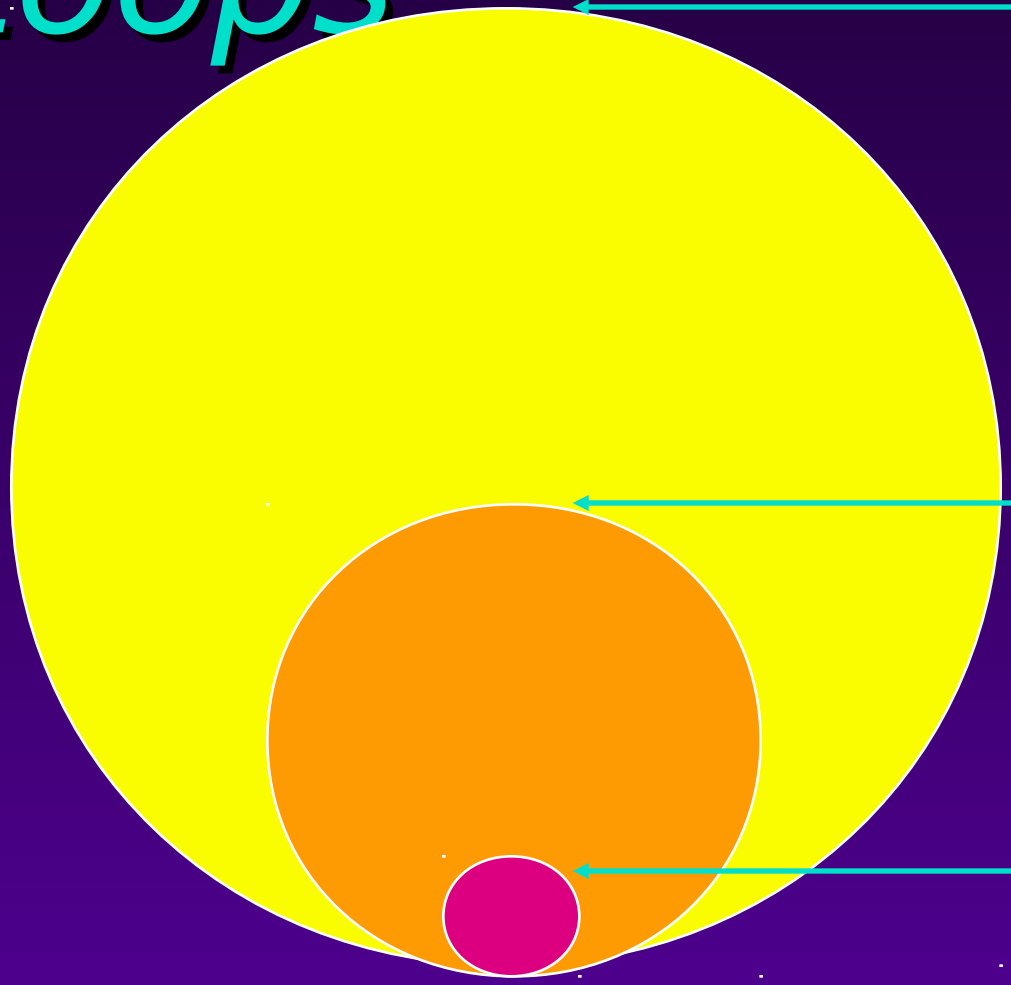
Strategic

Operational

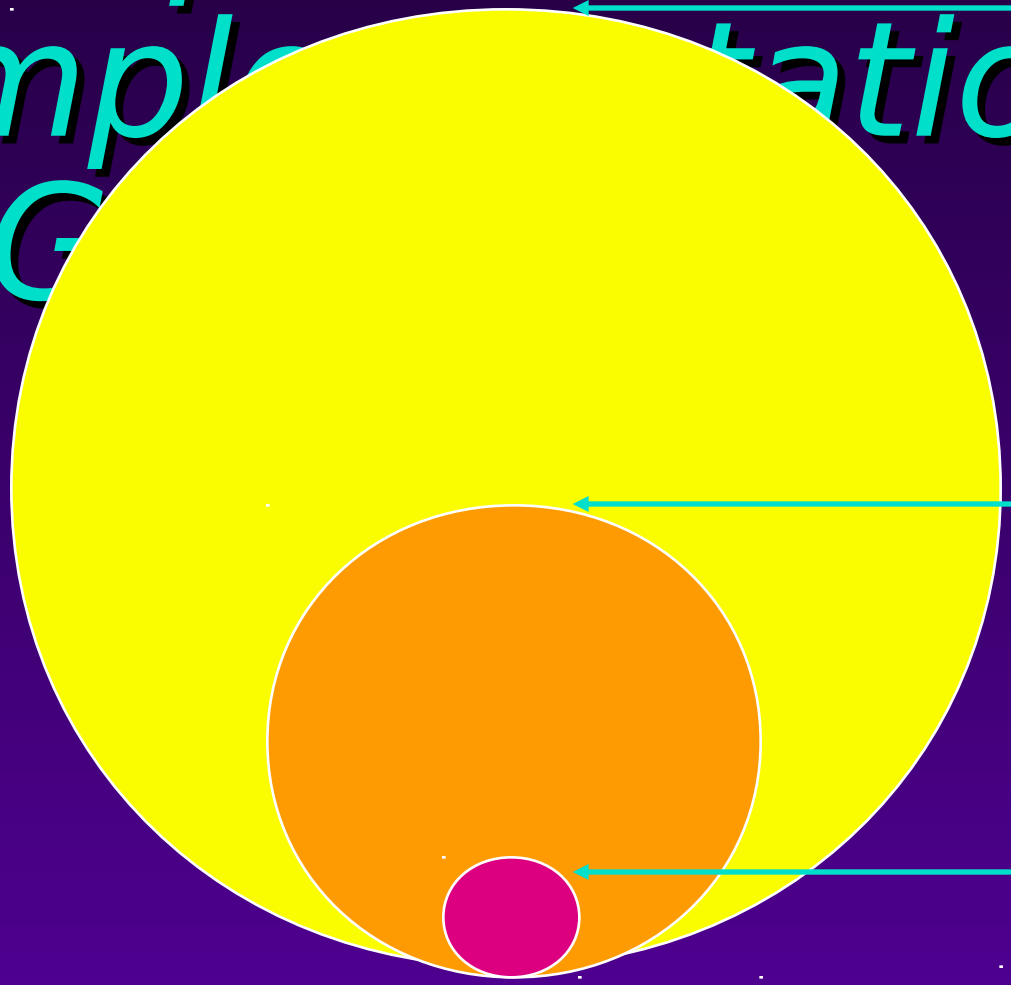
Tactical



Nested Decision Loops



Nested Decision Loops Implementation in 3G



Why Ripple Effect

All politics are local.

Tip O'Neal

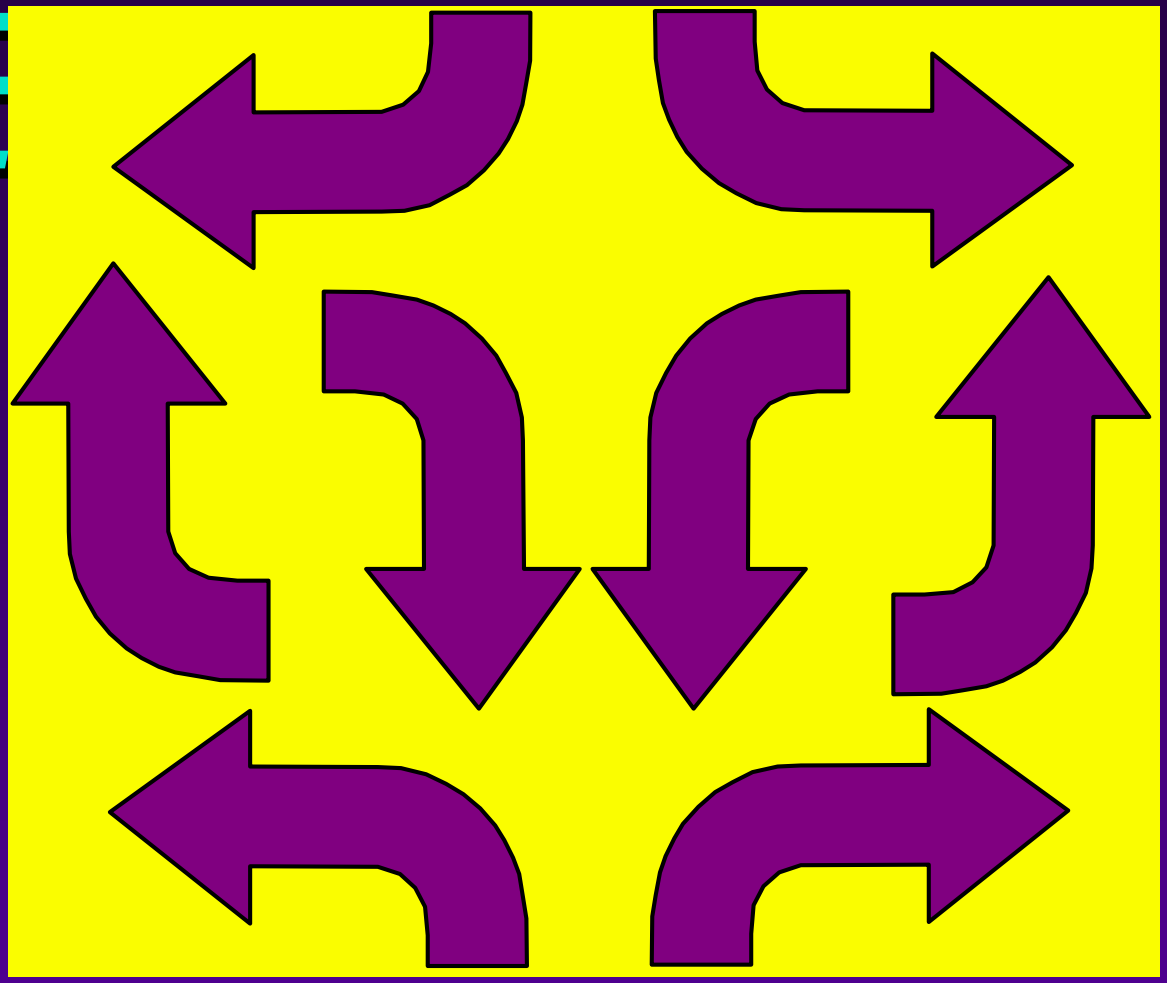
All events are tactical.

Matt Caffrey

Tactical Events Cascading to Strategic Effects

- Dolittle's Raid
  - Tactical event - lost 16 medium bombers
  - Operational impact - Japanese divert forces
  - Strategic impact - Huge moral impact
- Death in Vietnam
  - Tactical event - infantry man lost to mine
  - Operational impact - none
  - Strategic impact - loss of support for war

System E



Design Principle

Harmony between real and modeled systems:

- Real combatants function as systems made up of internal systems
- Models must depict all combatants as systems of systems

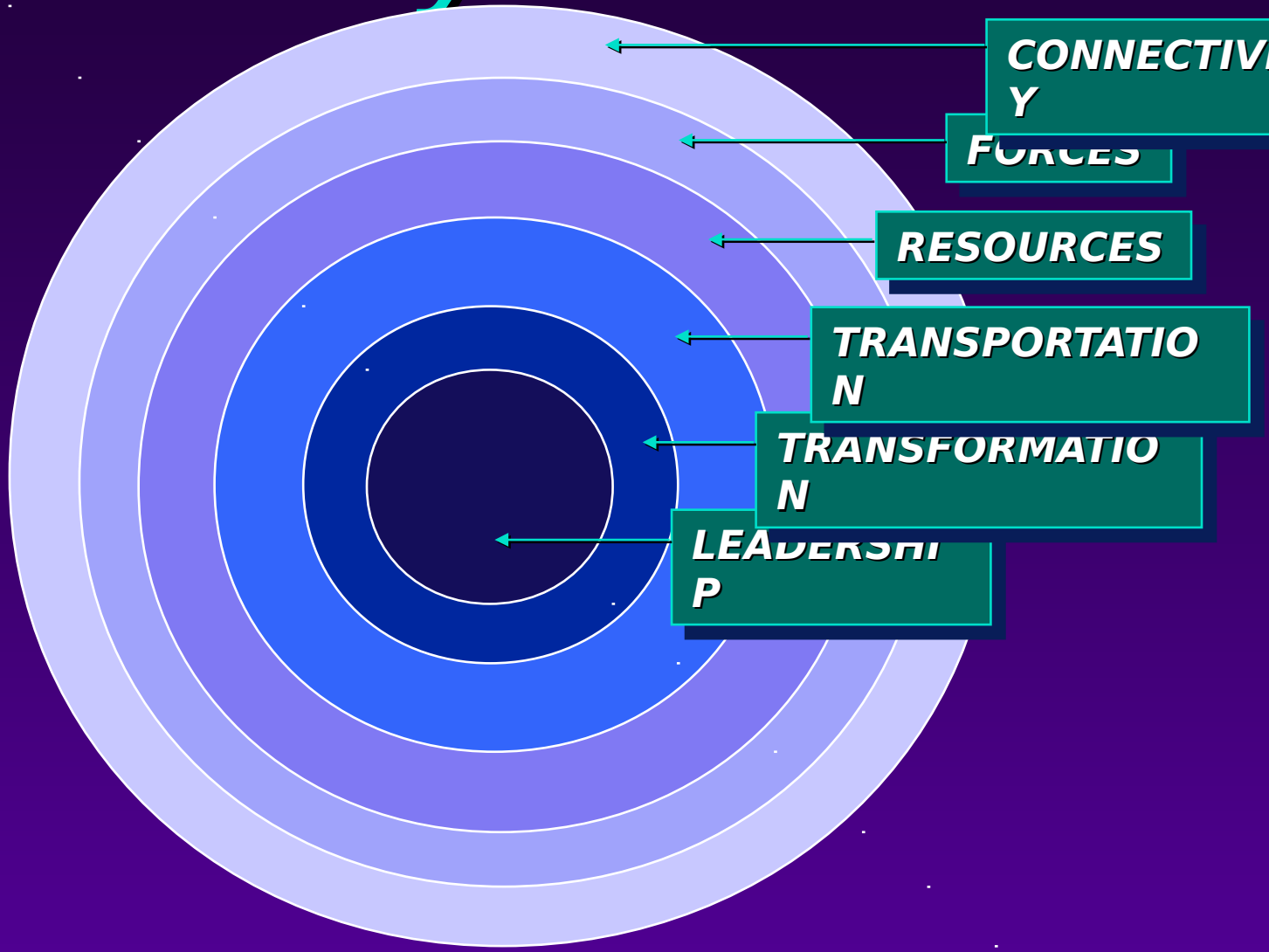
Consequences When Not Implemented

- Indirect effects not depicted
  - Energy crisis of 70's never happened
  - Germany Wins First World War
- Friendly vulnerabilities not identified
- Unanticipated consequences not detected

Warden's Five Rings

Forces
Population
Infrastructure
Essentials
Leadership

The Enemy as a System



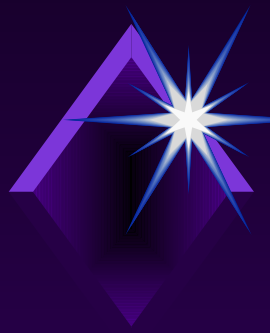
Adversaries as Systems

Enemy

- C3I (Info/morale)
- Transformation
- Transportation
- Resources
- Military

Coalition

- C3I (Info/morale)
- Transformation
- Transportation
- Resources
- Military



Each Entity as a System

Oil Refinery

- Management
  - Comm
  - Morale
- Cracking Towers
- Pipe Lines
- Crude Oil, Power
- Guards

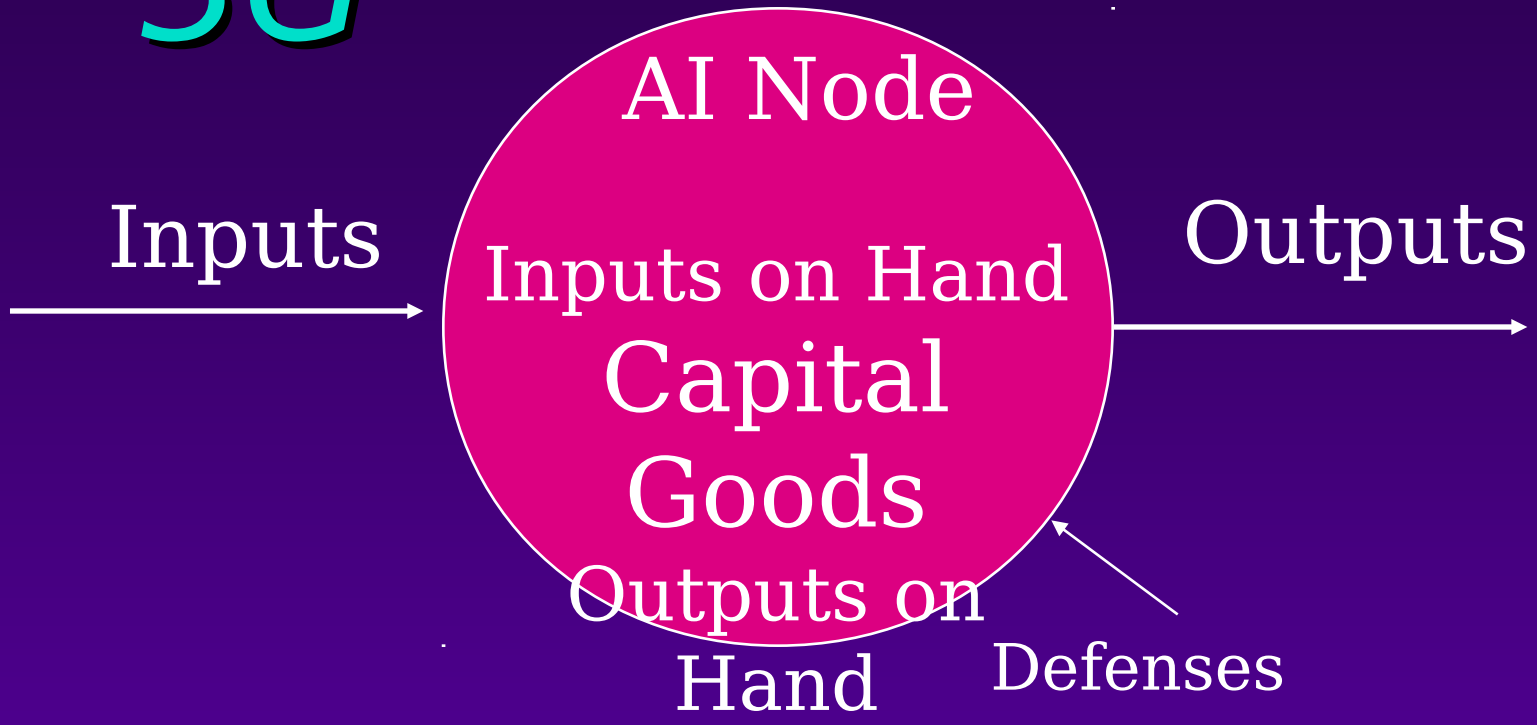
Fighter Wing

- Wing Ops Center
  - Intel/training state
  - Morale
- Maintainers
- Fighters
- POL, Munitions...
- Security Forces

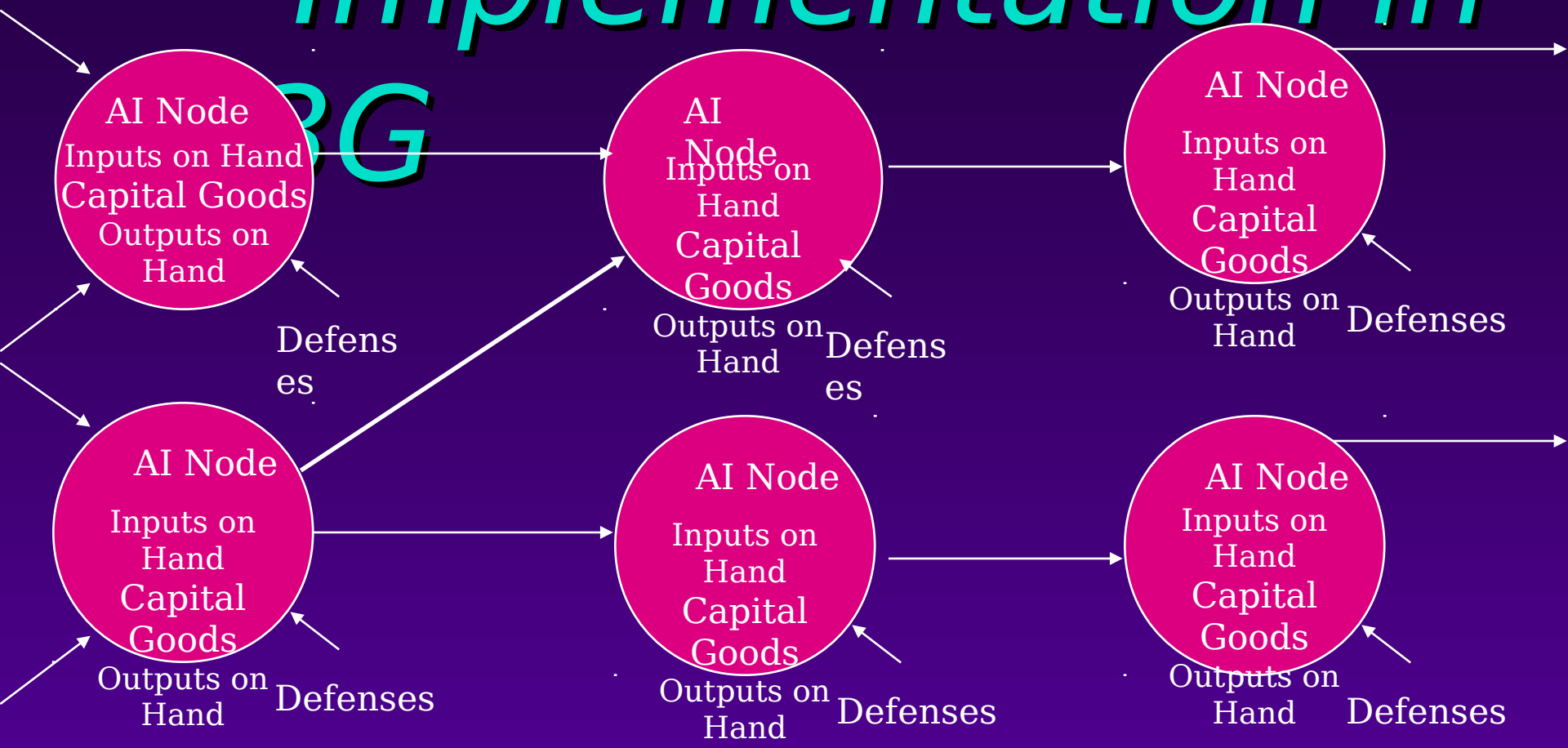
Each System with Inputs, Capital Assets & Outputs

Inputs	Capital	Outputs
Crude Oil, Electricity	Cracking Towers	POL
POL, Parts Ammunition,	Runway, F-15s	Combat Power

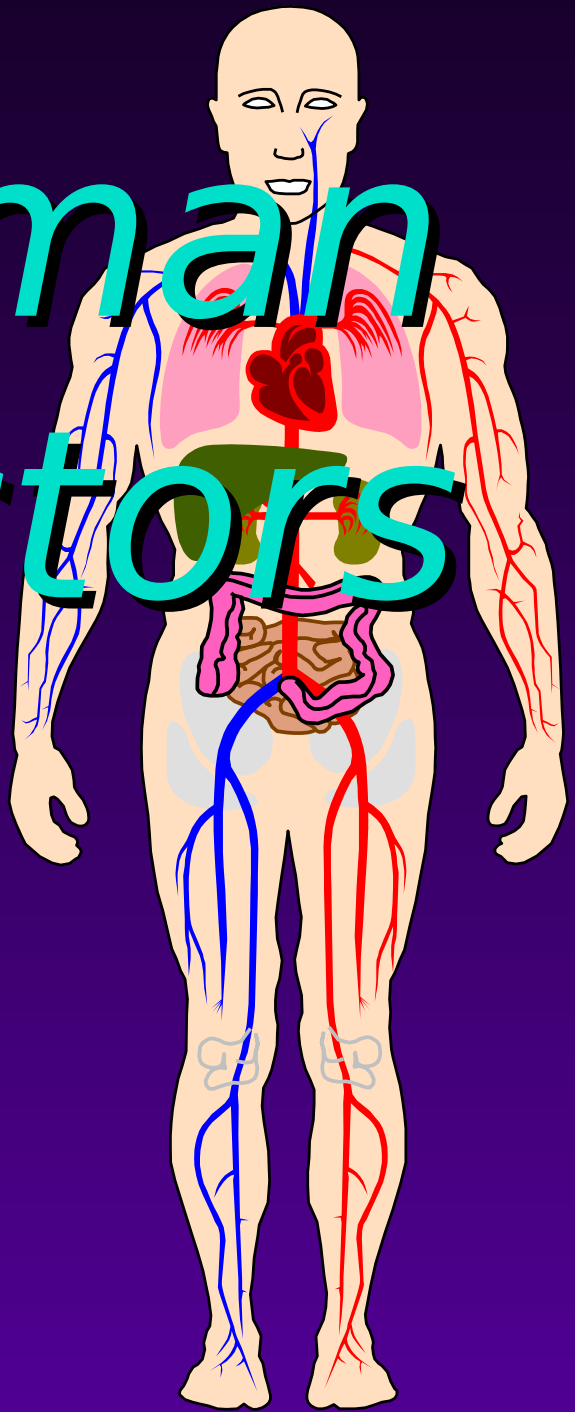
System Effects Implementation in 3G



System Effects Implementation in 3G



Human Factors



Design Principle

Harmony between real and modeled human impacts:

- Human capability (training, experience) should influence effectiveness
- Human decision criteria (doctrine, culture) should be reflected in AI.

Consequences When Not Implemented

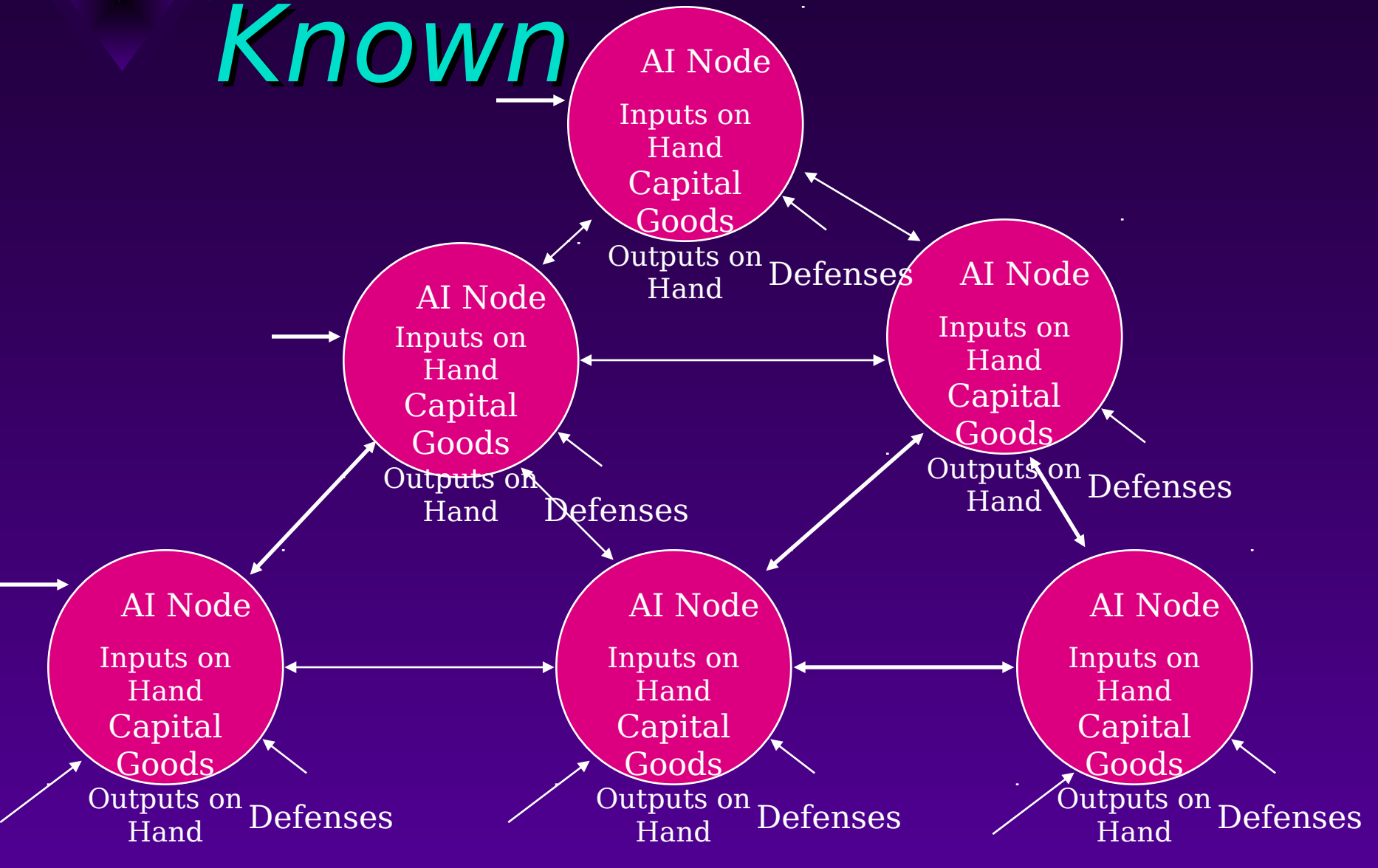
- Unit Performance Inappropriate
  - The Marianas Tie
  - The Red Baron Study
- Decisions Inappropriate
  - US Wins Vietnam War
  - Zero Iraqi Soldiers Surrender

Human Factors

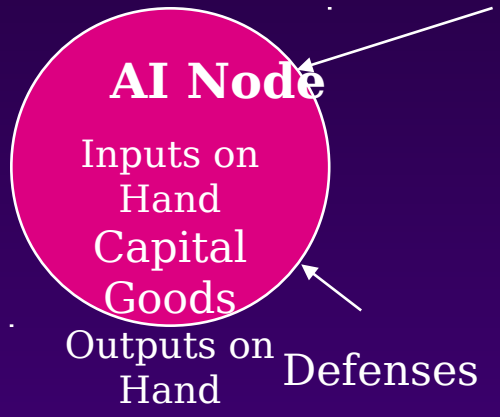
Human factors influence each level of war

- **Strategic:** decisions of war or peace are political decisions
- **Operational:** IO/IW, deception has been decisive
- **Tactical:** Crew fatigue, training, morale have all played key roles

Modeling What Is Known

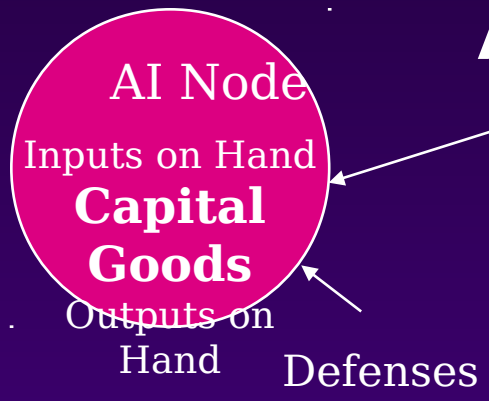


Modeling How They Think



- Building the AI Node, decision rules
  - Doctrine, Effectiveness
  - Cultural Norms, Acceptability
  - Logistics, Feasibility

Modeling Who They Are



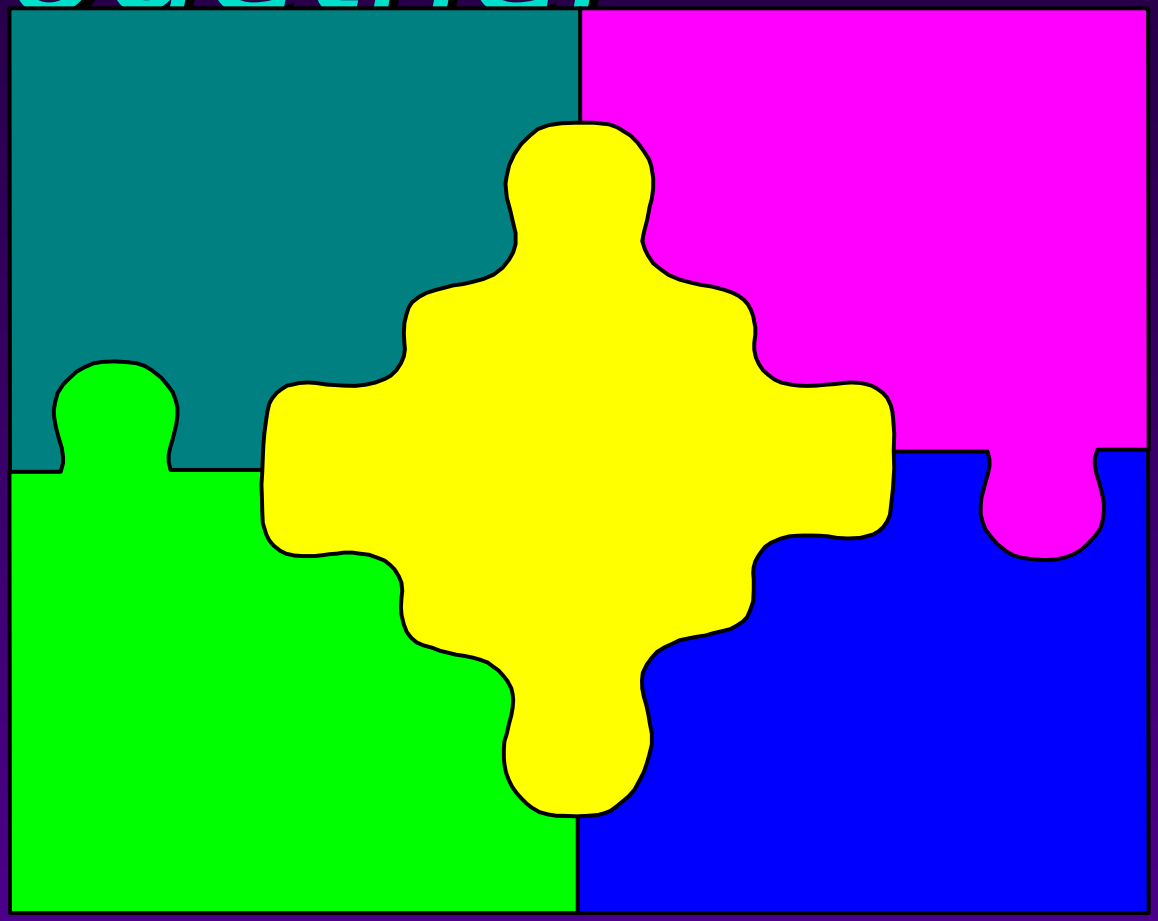
All men may be created equal, but they don't stay that way

- Training Level
- Cohesion
- Health/Fatigue

Human Factors Implementation in 3G

- Nodes (AI or human controlled) will only know information that reaches it -- true or false
- AI nodes to implement realistic decision criteria on break points etc.
- Characteristics of personnel modeled
- Political consequences of

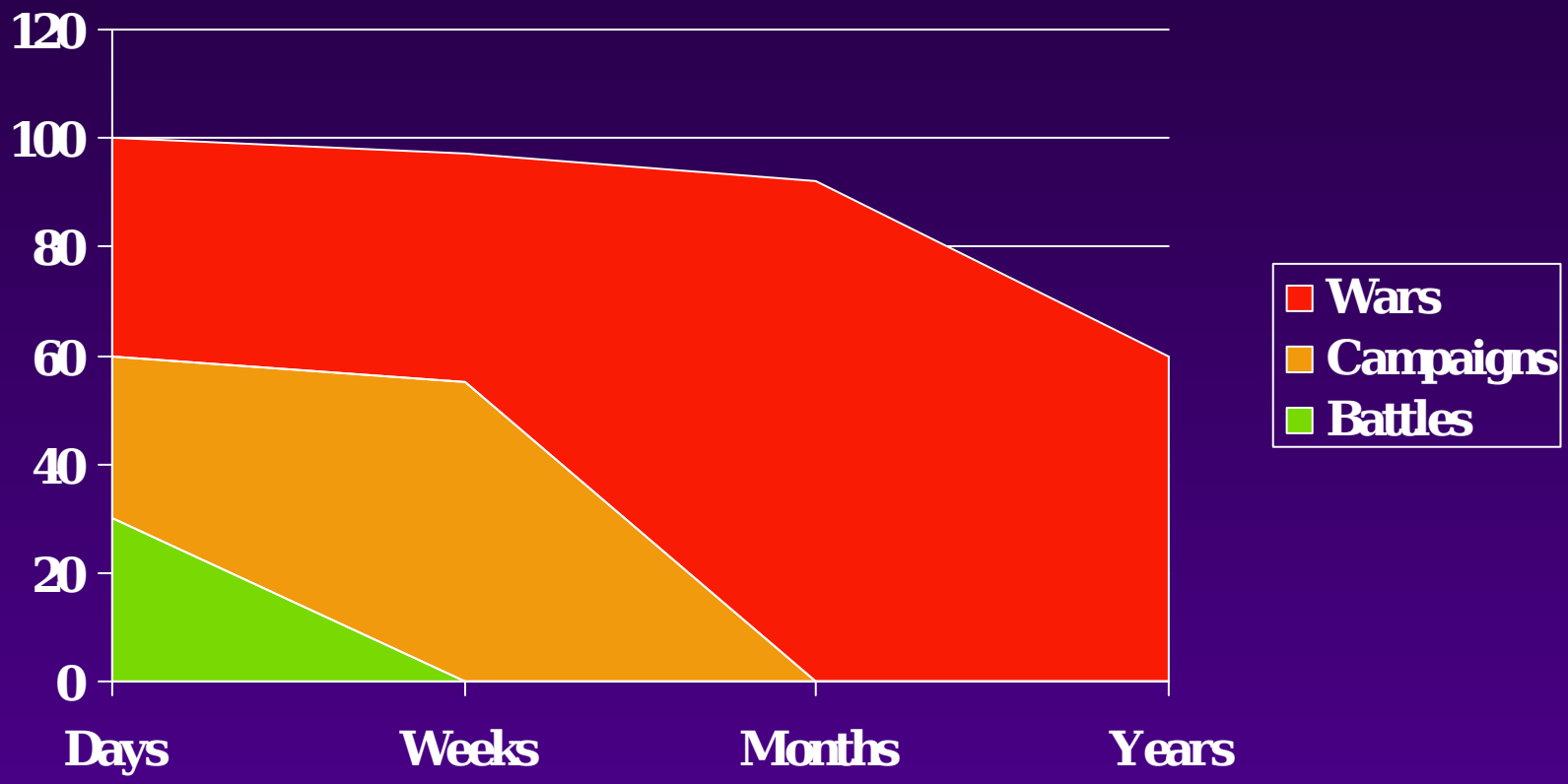
Putting It All Together



Putting It All Together

- All actions are initially tactical
- “All” actions have physical, informational and attitudinal impacts
- In cases when these impacts “ripple” through the system strategic effects may occur

Representative Durations



Building the Simulation

- Game space populated by entities that include:
  - An AI rule set with starting attitude
  - “Capital” goods
  - Expendables
- All entities
  - Consume expendables, receive information
  - Produce outputs, transmit information
- Turn cycle for each entity appropriate to command level

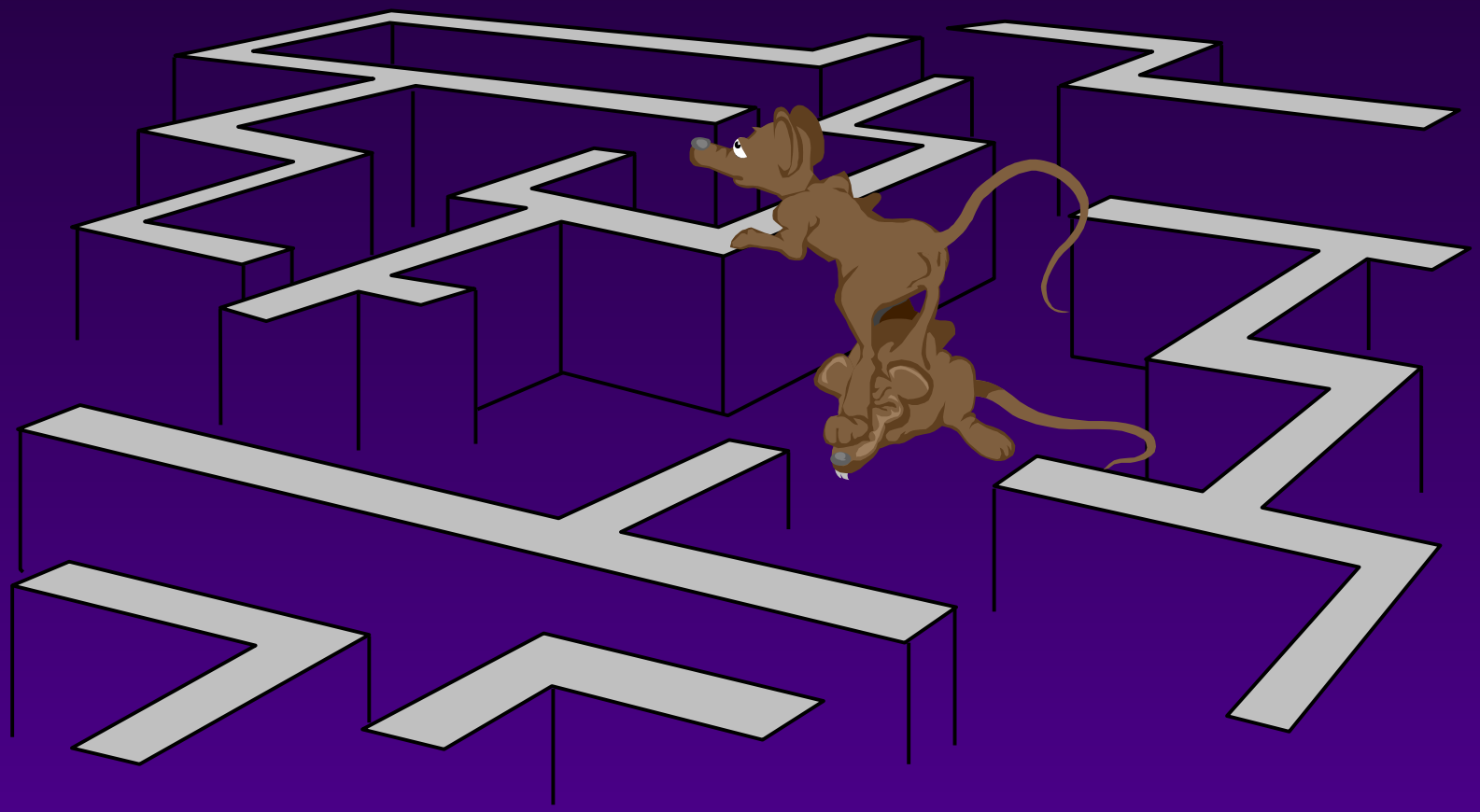
A 3d Generation Wargame Is:

- Theory Neutral - any theory can be tried
- Type of Conflict Neutral - war, insurgency
- Is Instrument of Power Neutral - any IP
- Should even provide visibility into natural disasters

In Summery

- What we called wargames in the past were really battle games
- Today we are refining some pretty reasonable campaign games
- The 3d Generation Wargame will be the first true War Game, its features will enhance campaign games significantly and battle games somewhat.

Accessible



Accessible

The 3d Generation Wargame will have an impact proportional to that produced by going from mainframe to desktop computers.

To do that it must:

- Run on the most widely used notebook & desktop computers
- Be truly intuitive to run and modify

Creating The 3d Generation Wargame

Project Flow

- Phase One -- Fly Off
- Phase Two -- Predict the Past
- Phase Three -- Application

Project Flow - Why

- Why Fly Off?
  - Facilitate Innovation

Project Flow - Why

- Why Fly Off?
  - Facilitate Innovation
- Why Predict the Past?
  - “Shakedown Model”
  - Enhance Credibility

Predicting The Past

Why -- WWII ETO

- Data Largely Unclassified
- Joint/Combined
- All types of warfare
  - Amphib, Airborne, Insurgency, Strategic Attack, Sub/Anti-Sub, Armor, Info Ops
- Commercially Viable

AWACS

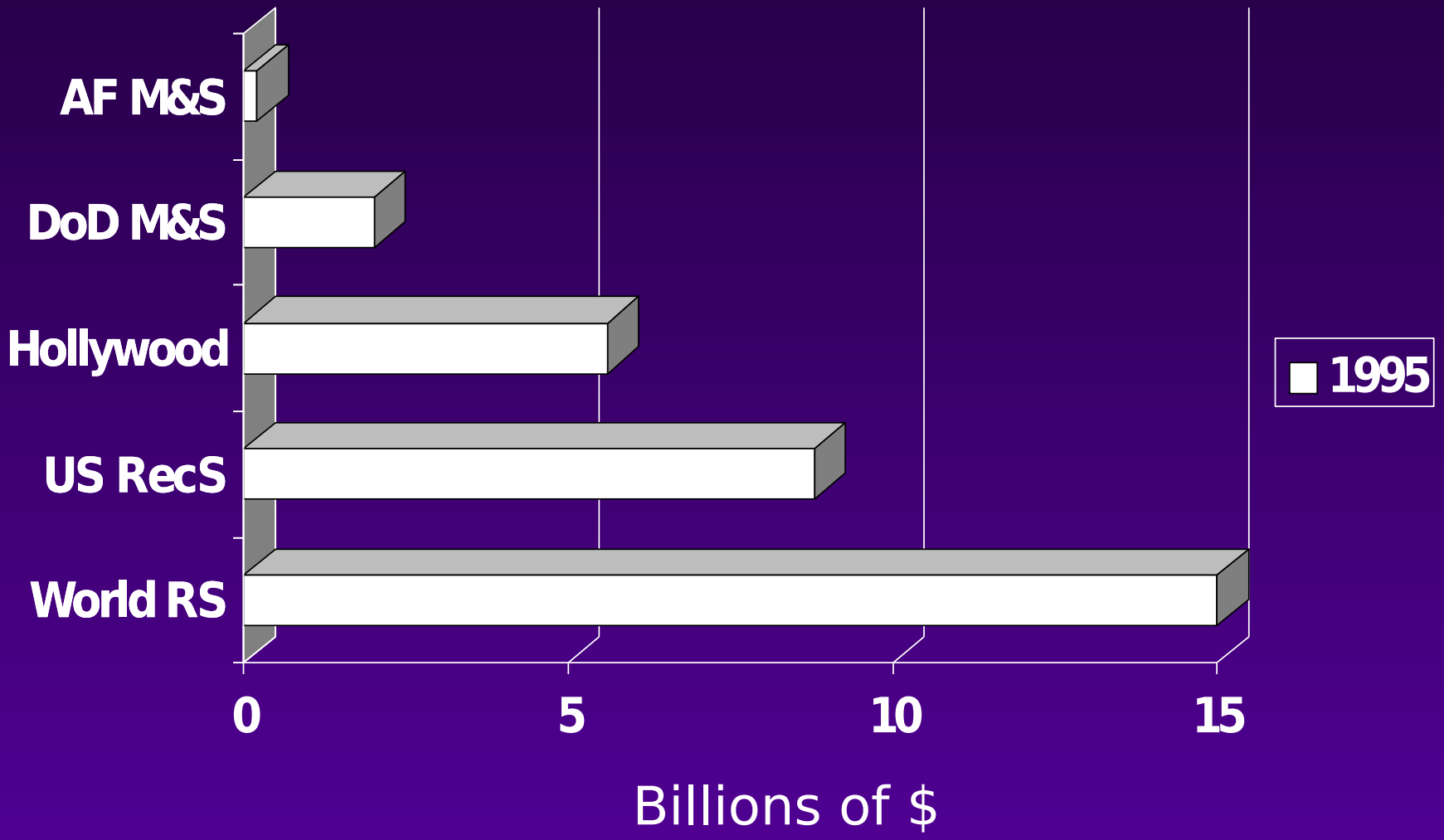
Why Focus on Commercial Software Developers

- Top Down Thinking
- Big, Competitive, Innovative
- Proven Capability

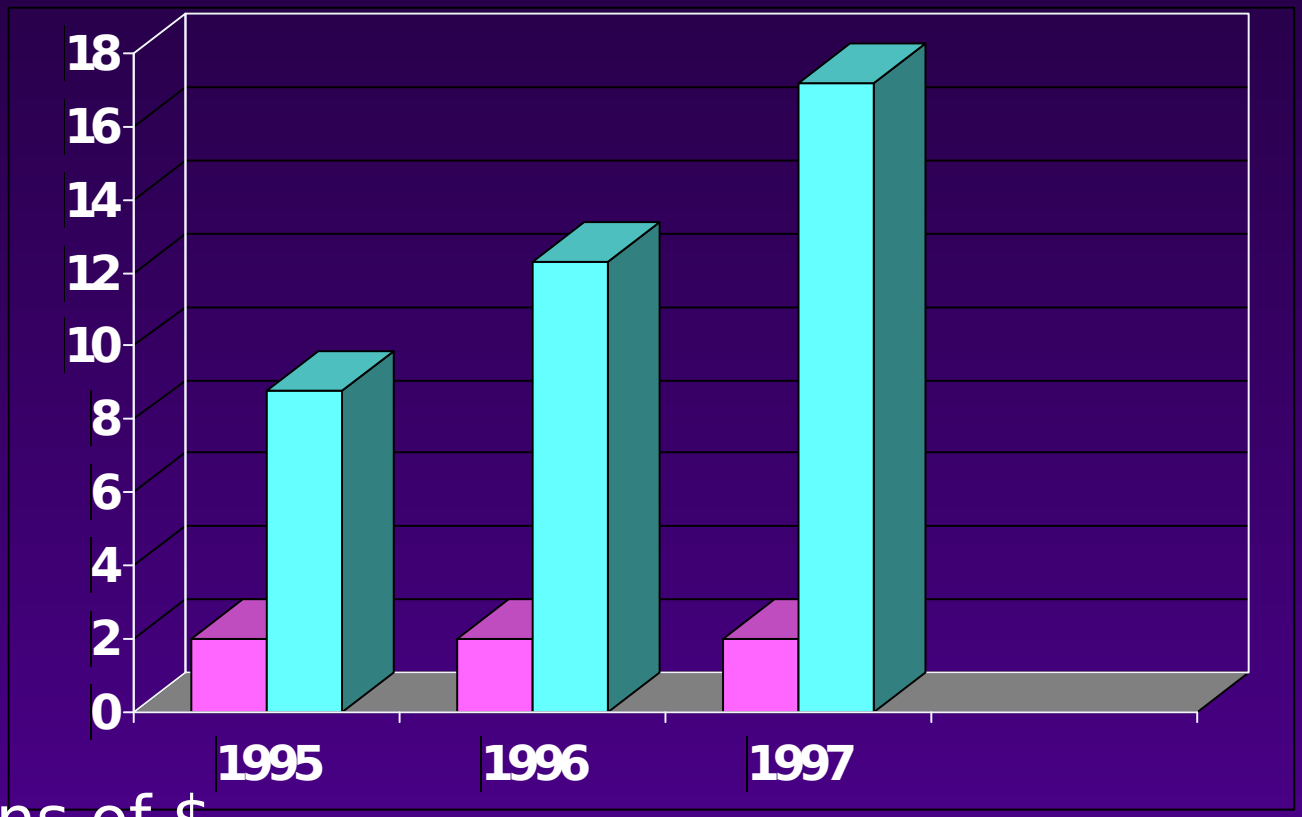
DoD vs Commercial WGs

Analysis Training PME Prof Dev
Recreation

Relative Spending



Spending on Modeling & Sim



Billions of $

3rd Generation Wargame Requirements

- Comprehensive
- Effective

A commercial design can meet all these requirements

A Commercial Design Can Fit Requirements

Comprehensive

- System Effects – USAAF, Sim City, Imperialism
- Human Factors - about 10% of the 3800 titles published
- Nested Decision Loops - Battle Front, Battle of Britain, Carriers at War II

A Commercial Design Can Fit Requirements

Effective

- Fast to:
  - Learn World Class
  - Modify Common Feature
  - Execute Near Instantaneous
- Accessible Run on notebook computer

Other Project Customers

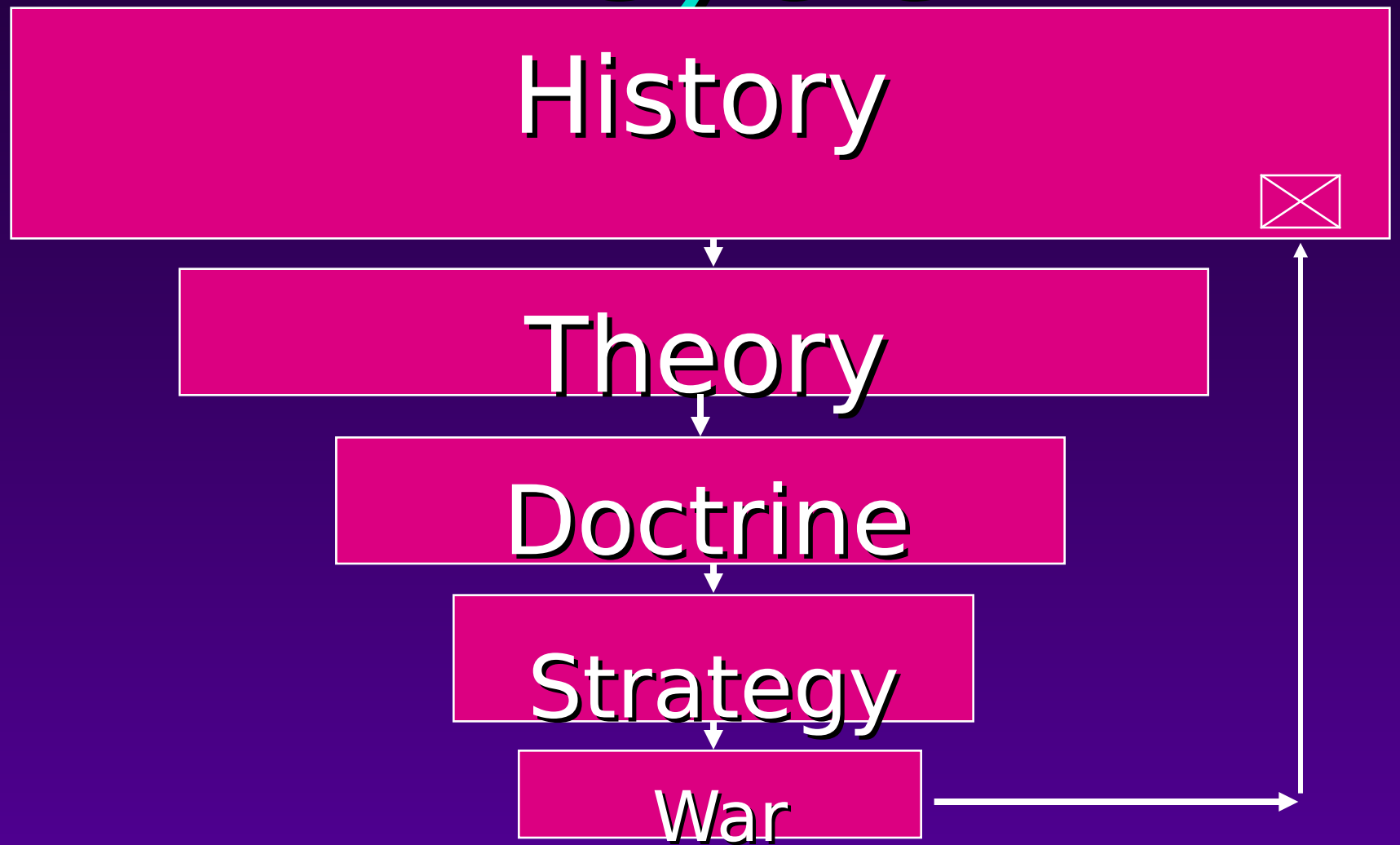
As with FAX machines, the more who use the Planning Tool the better for your organization

- Joint and Service Staffs
- CinC/JTF, NAF Strategy Cells, AF/XOOC
- Doctrine Centers
- Professional Military Education
  - Intermediate & Senior Schools
  - Resident & Distance Learning Programs
- Laboratory/Procurement Community
- Quadrennial Review
- Public Information - Commercial Edition

End State

- Military possesses comprehensive, accessible conflict/campaign wargame for: COA exploration, education, doctrine development, and exploration of technology impacts
- Taxpayers have access to product that accurately portrays armed conflict
- Link is forged with dynamic industry
- “Core” (i.e. JSIMS) engines enhanced

The Caffrey Cycle



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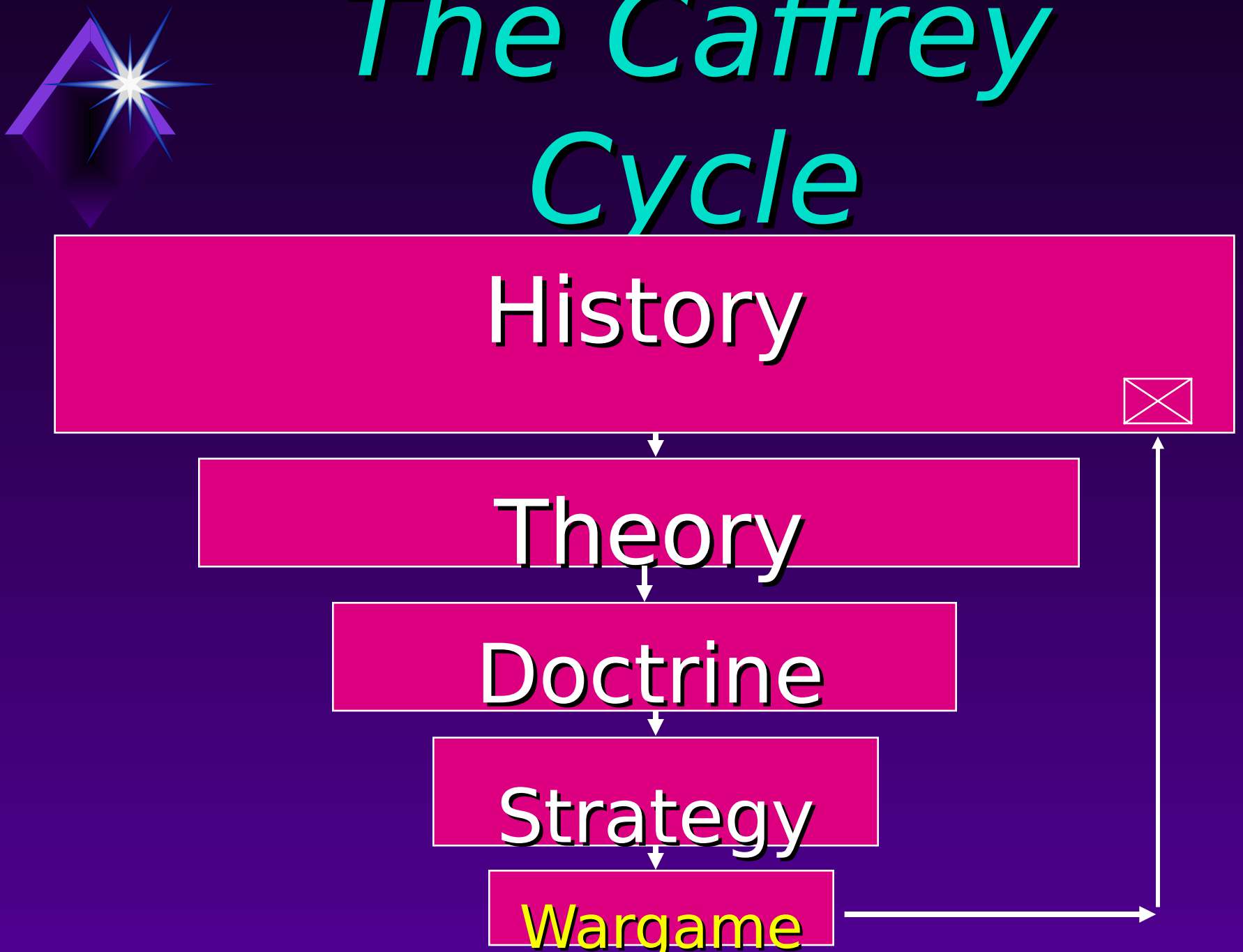

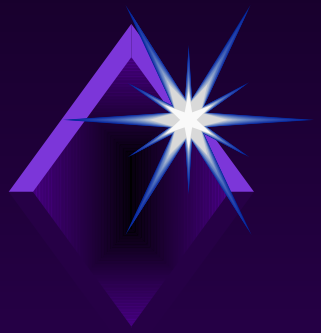

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